

Lake Tahoe Total Maximum Daily Load Atmospheric Deposition Focus Team Meeting Summary

September 10, 2007, 1 - 4 p.m.

Session 1 objective: Discuss potential options for reducing atmospheric sources of fine particles, nitrogen and phosphorus to Lake Tahoe

Meeting Attendees: Dr. Countess Countess, John Reuter, Chad Praul, Bob Larsen, Doug Smith, Karen Fink, David Fournier, John Riverson, Karen Fink, Charles Emmett, Jolaine Johnson, Larry Benoit, Jeremy Sokulsky, Jack Landy, Michele Sweeney (facilitator), Dave Roberts, Gordon Shaw, Rebecca Bryson (note-taker)

Summary of the Presentations

Introduction and Opening Statements

The facilitator opened the meeting by explaining that that this was the first meeting of the Atmospheric Deposition Focus Team, comprised mainly of agency staff. She noted that there are three other focus teams meeting the next day: Urban Uplands/Groundwater, Forest Uplands, and Stream Channel. The objectives of the meeting are:

1. To update the Focus Team on the latest TMDL-related research and answer any initial questions and clarify the materials presented.
2. To get feedback from the Focus Team on how the information is organized and presented prior to the first public presentation
3. To receive input on potential options for reducing atmospheric sources of fine sediment particles, nitrogen and phosphorus to Lake Tahoe, and
4. To provide recommendations on additional research needed or policy matters raised by proposed pollution controls.

Water Board Presentation

Bob Larsen, the Project Leader from the Lahontan Regional Water Quality Control Board (Water Board) gave a brief overview of the TMDL process and findings to date. This presentation and the most recent documents produced by the TMDL can be found at: http://www.waterboards.ca.gov/lahontan/TMDL/Tahoe/Tahoe_Index.htm.

Atmospheric Experts' Presentation

Dr. Richard Countess, the Team Leader from the Atmospheric Deposition source category group (SCG) then gave a presentation of the findings from his team. The presentation is available at the URL listed in the previous paragraph. A summary of their analysis can be found in section 2.2 of the Lake Tahoe TMDL Pollutant Reduction Opportunity Report, also available at the URL above.

Question and Comment Session

Presentation of Information: There were several questions/comments on the way information was presented and the PCOs were segregated into the different tiers and source categories. Several participants suggested this type of presentation might be difficult for the general public to grasp and assess.

John Reuter explained that the SCG Teams were specifically asked to divide the information this way to form a basis for the overall framework. Based on this initial analysis and stakeholders' input on the individual strategies, the Water Board will develop packages or combinations of PCOs across Tiers and Source Categories. These packages will then be analyzed using the Clarity Model to assess the collective, anticipated benefit to lake clarity. While the Focus Team is seeing a great level of detail, the consultant team plans to aggregate the results at a higher level for the public audience.

Synergies with Other Source Categories: There was then some discussion about how many of the control measures in this category would overlap or synergize with those in other categories – most specifically urban runoff. It was suggested that these synergies be highlighted and emphasized in the technical documents where possible. It was also suggested that the cost estimates try to reflect that as well. For example, deposition occurs both on the lake and on the surrounding land that may contribute to the pollutant load that eventually makes it to the lake through urban runoff. Since the lake comprises nearly ½ the surface area of the Basin, reduction in atmospheric deposition on the lake also could theoretically mean a similar amount reduced in urban runoff. Cost/benefit estimates should reflect that theoretically, up to double the benefit could result.

Pollutant Budget: Dr. Countess asked about the basis for Lake-wide fine sediment particle number budget and whether the Water Board could provide references. The TMDL team noted that all references will be cited in the Phase I Technical Report to be released on Sept 14.

Source of Emissions: Gordon Shaw asked what percentage of emissions was from resuspended soil dust versus tailpipe emissions. For local paved highways the ratio is about 53 to 1; for other paved roads, the ratio is about 16 to 1; for unpaved roads, the ratio is about 8,000 to 1.

Vacuum Sweepers: John Reuter asked whether the types of vacuum sweepers the SCG considered in their analysis of Tier 2 and Tier 3 options were similar to what currently exists in the Basin or more efficient. Dr. Countess explained that they were considering a much more efficient type of street sweeper. The PM-efficient vacuum sweepers are about twice as expensive but collect and retain a much higher percentage of the road dust material compared to ordinary street sweepers. He estimated the Basin would need 6 units for biweekly sweeping and 12 units for weekly sweeping. This assumes 75 miles of roadway/week for each sweeper.

Cost-Effectiveness (Slide 19): It was pointed out that 1 ton of inorganic nitrogen is not equivalent to 1 ton of FS in terms of clarity reduction. It was suggested that the slide 19 be changed to reflect the cost per percent of budget going into the lake. It was noted that since the clarity of the lake is influenced more by the particle count than by mass, it would be useful if the table in slide 19 could be changed to reflect that as well. Finally Dr. Countess noted that since atmospheric sources of phosphorus are associated with atmospheric sources of FS, the atmospheric deposition budget and load reduction estimates for phosphorus should be based on particle count rather than mass.

The group also discussed what government agencies typically consider to be cost effective. In the past \$5/lb was considered to be cost effective. The cost-effectiveness for the PCOs for FS is approximately \$5/lb for Tiers 2 and 3.

Finally, there was a question of whether it is possible to invest separately in PCOs for FS and nitrogen. Dr. Countess responded in the affirmative to this question and stated that you might have one agency responsible for PCOs focused on nitrogen and another agency focused on PCOs for FS. He explained that the cost estimates for phosphorus reduction are identical to that for FS reduction since atmospheric sources of phosphorus are associated with atmospheric sources of FS. Since the phosphorus content of FS for atmospheric FS sources is ~0.3%, the cost-effectiveness of the PCOs for phosphorus are about 333 times that of the cost-effectiveness of the PCOs for FS.

Visitor Fee Revenue/Vehicle Reduction Discussion: Dr. Countess first addressed how the visitor fee revenue based on a fee of \$20/day was derived, explaining that it would be charged per vehicle per day for those visitors electing to drive into the Basin rather than leave their car at a park-n-ride lot at the major access points to the Basin. The assumed revenue generated by this fee shown on Slide 20 was based on an average of 2 people per car. He also noted that the daily fee could be \$10/day or \$30/day; \$20 was just an initial suggestion.

Then there ensued a long discussion on the political viability of this option. In the past, businesses/politicians have been concerned that such an approach could drive away visitors to the Basin. It was also suggested that there is not enough data to show that charging a fee would in fact reduce the number of visitors' vehicles in the Basin and by how much. Dr. Countess pointed out that his team had recommended conducting surveys to answer this issue.

Gordon Shaw suggested that another possibility was to try to reduce/eliminate vehicle trips once visitors/residents were in the Basin. One option here is to create an extensive paid parking system. The advantage of this is that the system could be developed on an incremental basis. It was asked what the community would need to see in order to support this program, and how the TMDL project could help. Gordon noted that Tahoe often considers itself out front, but many cities are ahead of us. Presenting research about what other areas are doing in this area and the positive benefits could help change minds.

He also noted that in terms of getting people off the roads, it is a matter of carrots and sticks. He thought carrots such as a very efficient transport system could help get 5-10% of cars off the road, but sticks would be needed for real change. He noted that the fees for the parking could offset the costs of the transit system.

Suggested Future Research:

- Research other areas, like Yosemite, that have initiated such projects and the resulting impacts on car usage.
- Get a legal opinion on how the daily visitor fee could work as the current understanding is that state run highways funded by the federal government cannot have fees associated with them without an act of Congress.

Karen Fink asked how the numbers shown on Slide 20 were derived. Does the transit system proposal assume that people all park and use the mass transit? Dr. Countess explained that under Tier 2 the goal would be to reduce mobile sources by 10%. Under this scenario, the pay and ride system would be designed to get 10% of the visitors arriving by car to park/ride while 90% would pay the fee. Under Tier 3, it assumes 75% are paying fees. Charles Emmett noted that while one might assume that the fees generated could help pay for the mass transit system involving clean burning hybrid buses, that scenario does not always happen in reality.

Mass Transit System: Gordon Shaw asked about using CNG versus diesel electric for the mass transit system. It was noted that CNG fueled vehicles may emit as much nitrogen and greenhouse gases as gasoline and diesel fueled vehicles. It was agreed that the document should acknowledge this point because stakeholders may ask about it. Charles Emmett asked if/how the estimates on vehicle emissions were made regarding the increased FS emissions from the buses that would ensue under the proposed mass transit system. Charles pointed out that buses typically produce significantly more pollutant emissions due to their weight and number of wheels compared to cars. It should be pointed out that the SCG team assumed that each bus would replace a minimum of 8 cars on the roads.

Suggested Future Research:

- Analyze the break-even point of nitrogen and resuspended road dust emissions from the increased number of buses of a mass transit system and the subsequent reduction in number of cars.

Framing the Discussion: Finally, it was pointed out that both the visitor fee and the mass transit system were not control measures per se; rather the control measure is to decrease vehicles by a specific percentage and the discussion should be framed accordingly.

Several participants noted that neither the visitor fee, nor the mass transit system are new ideas in the Basin and would likely meet with resistance. Therefore, the more the Water Board could frame the control measure as reducing car use, the better. Karen Fink suggested including a “middle strategy” option for on-road vehicle sources of nitrogen in addition to the major, expensive (if one excludes the revenue generated by visitor fees) option of instituting a mass transit system. It should be pointed out that the SCG team

did not assume fees for the use of the mass transit system by either visitors or local residents.

Suggested Future Research:

- Study the socio-economic factors that drive people's behavior in order to understand how best to reduce car usage in the future, both visitors and local residents.

Remote Sensing Option: Dr. Countess also suggested another alternative noting that the mass transit system would be expensive on an annual basis if one did not implement visitor fees. He noted that most of the inorganic nitrogen problem was likely coming from 10% or less of the vehicles. He suggested that for just a few million dollars, it would be easy to set up a remote sensing program to detect the gross NO_x polluters. He thought this might receive more acceptance as it truly targets those causing the problem. Charles Emmett noted that although it could be considered, (1) the locals tend to have the dirtiest cars so they might not support this option, (2) the remote sensing technology does not work very well in the Tahoe air basin where there are high levels of dust on the paved roads, and (3) cars that don't meet smog check requirements, do not necessarily have the highest NO_x emissions. Charles also noted that untuned cars may actually have lower NO_x, although they may also have higher hydrocarbon emissions.

Eliminated PCOs: A meeting participant asked which PCOs for minor sources were eliminated (as referred to in Slide 9). For example, the report contains a control measure for commercial boating but the presentation did not address that in Slides 19 and 20. Dr. Countess explained that they eliminated the proposed PCO for commercial boats because they had recently learned that commercial boating activity are a negligible source of nitrogen emissions in the Basin. CARB's 2005 emission inventory for the Basin indicated that commercial boating accounted for 14% of the total NO_x emissions, but recent data from TRPA indicate it is less than 1%. Dr. Countess explained that his team did not recommend any control measures for recreational boating that accounts for about 6% of the total NO_x emissions or for aircraft that accounts for about 2% of the total NO_x emissions. He also explained that the proposed PCO for residential wood combustion (RWC) assumes a 25% reduction in RWC activity for Tier 2 and a 50% reduction for Tier 3. However, since RWC accounts for only about 3% of the total NO_x emissions, the resulting inorganic nitrogen load reductions were not significant.

Prescribed Burns: Dr. Countess noted that prescribed burns were accounted for under "Area Sources" and make up about 2% of the total NO_x emissions. Wildfire had not been accounted for but as John Reuter noted, there was not much data on wildfire emissions in the Basin. John reported that inputs of nitrogen to the lake from the recent Angora Fire in the form of air deposition comprise only 2-4 % of the annual input for all sources. Jack Landy asked whether growth in the amount of prescribed burns due to increased fuel reduction were accounted for in the load reduction estimates and the answer was no. It was noted that none of the SCGs had been tasked with looking at growth or likely future change in pollutant loads. [Although the urban runoff SCG did consider a build-out scenario, as stated in the Focus Team meeting on September 11th.] Dr. Countess noted

that the Basin-wide emission inventory included Basin-specific emissions data for prescribed burns, campfires and residential wood burning based on a UC Riverside study done for CARB in 2004.

Suggested Future Research:

- Analyze the number and type of boats on the lake. It should be noted that Charles Emmett stated that TRPA has a fairly good emissions inventory for boats operating on the lake and that CARB has signed off on TRPA's estimates. Dr. Countess suggested that TRPA's underlying assumptions should be reviewed.
- Analyze potential increases in boat use/emissions related to proposed changes to the shore zone ordinance.
- Analyze impacts of expected increases in fuels management (also taking into account potential biomass utilization).
- Analyze potential air quality impacts of future growth/build-out.

Sources on Vehicle Miles on Unpaved Roads: There was a question about the accuracy of the daily vehicle miles assumed by the SCG team for unpaved roads (namely 20). Dr. Countess explained that the number was derived from the CA DOT's estimate of 36-40/mile-day on an annual basis, which seemed high for unpaved roads in Tahoe because unpaved road emissions essentially go to zero for many unpaved roads at high elevation in the winter. He assumed 20 vehicles/mile-day for unpaved roads in the Basin on an annual basis, even though the numbers may be lower. However, he also assumed heavier vehicles with more wheels than vehicles traveling on paved roads that would cause an increase in resuspended road dust.

Deicers vs. Sand/Cinders: Dr. Countess noted that his team did not analyze the impact of switching from sand/cinders to deicers. He had assumed that the sand/cinders were removed quickly but meeting participants noted that during winters in the Basin, it could be as long as 3-4 months before roads are cleaned.

Suggested Future Research:

- Additional analysis of the potential load reductions of switching from sand/cinders to deicers

Protocols for Air Deposition Measurements: Charles Emmett asked about the protocols used for the field measurements leading to the atmospheric deposition pollutant load budget to determine if they matched existing Basin protocols. John Reuter stated that two sets of data were used, namely (1) CARB's atmospheric deposition results for N, P and FS from the 2003 Lake Tahoe Atmospheric Deposition Study (LTADS) and (2) UC Davis and TERC deposition bucket estimates for N and P from field measurements conducted for at least a decade. Dr. Countess pointed out that CARB's estimate for phosphorus was about one-third that of the UC Davis and TERC estimates.

Transportable Fraction: Dr. Countess pointed out that particle size plays a role in the transportable fraction of FS and P. For emissions of fine elemental carbon particles from combustion processes, that are typically less than 1 micron in diameter, he assumed a

transportable fraction of 100%; for FS and phosphorus associated with FS, he assumed a transportable fraction of 13% for the Basin.

Relationship of Phosphorus to FS: There was some discussion of what percentage of phosphorus is associated with FS. CARB's LTADS results and chemical profiles based on source test results for the major sources of FS in the Basin indicate a phosphorus content of 0.3% whereas the pollutant load budget in the TMDL report indicates a phosphorus content of 0.9%.

Suggested Future Research

- Assess what percentage of P is associated with atmospheric sources of FS

Wrap-up and Next Steps

The facilitator thanked Dr. Countess and members of the Focus Team for their input and emphasized the importance of the Focus Team members attendance at the follow up meetings outlined below:

September 27th 8am to 5pm: Pathway Forum Workshop

October 11th 8am to 5pm: TMDL Focus Team Meeting (with all Teams Together)

October 25th 8am to 5pm: Pathway Forum Workshop

December 6th: 8am to 5pm: Pathway Forum Workshop

February 7th: 8am to 5pm: Pathway Forum Workshop and Focus Team Mtg Final